

## CLAIMS

1        1. A process for analyzing proteins or viruses in a sample  
2 comprising the steps of:

3                dividing a sample having a protein or virus component into a plurality  
4 of aliquots;

5                applying said plurality of aliquots in parallel to a first separation step to  
6 yield a plurality of partially resolved eluates; and

7                subjecting said plurality of partially resolved eluates in parallel to a  
8 second separation step to yield a plurality of resolved fractions.

1        2. The process of claim 1 further comprising the step of collecting  
2 at least one of said plurality of resolved fractions.

1        3. The process of claim 2 wherein collection of the at least one of  
2 said plurality of resolved fractions occurs onto a MALDI target or plate.

1        4. The process of claim 1 further comprising the step of analyzing  
2 at least one of said plurality of resolved fractions.

1        5. The process of claim 4 wherein analysis is by mass  
2 spectrometry.

1        6. The process of claim 5 wherein said mass spectrometry is  
2 performed on a MALDI mass spectrometer.

1        7. The process of claim 5 wherein said mass spectrometry is  
2 performed on an orthogonal MALDI mass spectrometer.

1           8.       The process of claim 1 wherein at least one of said first and said  
2       second separation steps separate on a basis selected from the group consisting  
3       of: charge, molecular weight, and hydrophobicity.

1           9.       The process of claim 1 wherein at least one of said first and said  
2       second separation steps uses a chromatography resin or chromatography  
3       membrane.

1           10.      The process of claim 1 wherein at least one of said first and said  
2       second separation steps comprises a separation buffer that varies monotonically  
3       between individual aliquots or individual eluates.

1           11.      The process of claim 1 wherein at least one of said first and said  
2       second separation steps comprises a separation matrix in linear or two-  
3       dimensional array.

1           12.      The process of claim 11 wherein said first and said second  
2       separation steps occur with matrices maintaining well addresses in each of the  
3       two matrices.

1           13.      The process of claim 1 wherein at least one of said first or said  
2       second separation steps occurs within a microplate.

1           14.      The process of claim 1 further comprising the step of digesting  
2       said plurality of partially resolved eluates prior to subjecting said plurality of  
3       partially resolved eluates in parallel to said second separation step.

1           15.      A process for analyzing proteins or viruses in a sample  
2       comprising the steps of:

3               dividing a sample having a protein or virus component into a plurality  
4       of aliquots;

5               applying said plurality of aliquots in parallel to a first separation step to  
6       yield a plurality of partially resolved eluates;

7               subjecting said plurality of partially resolved eluates in parallel to a  
8       second separation step to yield a plurality of resolved fractions;

9               digesting said plurality of partially resolved eluates with a proteolytic  
10      enzyme to yield a plurality of digested eluates; and

11               subjecting said plurality of digested eluates in parallel to a second  
12      separation step to yield a plurality of resolved peptide fractions.

1               16.     The process of claim 15 further comprising the step of  
2       collecting at least one of said plurality of resolved fractions.

1               17.     The process of claim 16 wherein collection of the at least one of  
2       said plurality of resolved fractions occurs onto a MALDI target or plate.

1               18.     The process of claim 15 further comprising the step of analyzing  
2       at least one of said plurality of resolved fractions.

1               19.     The process of claim 18 wherein analysis is by mass  
2       spectrometry.

1               20.     The process of claim 19 wherein said mass spectrometry is  
2       performed on a MALDI mass spectrometer.

1               21.     The process of claim 19 wherein said mass spectrometry is  
2       performed on an orthogonal MALDI mass spectrometer.

1           22. The process of claim 15 wherein at least one of said first and  
2        said second separation steps separate on a basis selected from the group  
3        consisting of: charge, molecular weight, and hydrophobicity.

1           23. The process of claim 15 wherein at least one of said first and  
2        said second separation steps uses a chromatography resin or chromatography  
3        membrane.

1           24. The process of claim 15 wherein at least one of said first and  
2        said second separation steps comprises a separation buffer that varies  
3        monotonically between individual aliquots or individual eluates.

1           25. The process of claim 15 wherein at least one of said first and  
2        said second separation steps comprises a separation matrix in linear or two-  
3        dimensional array.

1           26. The process of claim 25 wherein said first and said second  
2        separation steps occur with matrices maintaining well addresses in each of the  
3        two matrices.

1           27. The process of claim 15 wherein at least one of said first or said  
2        second separation steps occurs within a microplate.

1           28. The process of claim 15 further comprising the step of digesting  
2        said plurality of partially resolved eluates prior to subjecting said plurality of  
3        partially resolved eluates in parallel to said second separation step.

1           29. The process of claim 15 wherein digestion occurs with a  
2        proteolytic enzyme.

1           30.   The process of claim 18 further comprising the step of analyzing  
2   at least one of said plurality of partially resolved eluates prior to digestion in  
3   concert with the corresponding resolved fraction.

1           31.   The process of claim 30 wherein analysis is by mass  
2   spectrometry.

1           32.   The process of claims 1 or 15 wherein the step of applying said  
2   plurality of aliquots in parallel to said first separation step is performed by a  
3   robot.

1           33.   The process of claim 1 or 15 further comprising the step of  
2   affixing a machine-readable label to at least one collection selected from the  
3   group consisting of: said plurality of aliquots, said plurality of partially  
4   resolved eluates, and said plurality of resolved fractions.

1           34.   The process of claim 1 or 15 further comprising the steps of:  
2           labeling a subsample with a unique tag; and  
3           combining said subsample with a second uniquely labeled subsample or  
4   an unlabeled subsample prior to said plurality of aliquots.

1           35.   A kit for separating proteins or viruses within a sample  
2   comprising:  
3           a first separation matrix;  
4           a second separation matrix;  
5           a separation buffer varying in concentration; and  
6           instructions for the use thereof for parallel separation of a sample into  
7   resolved proteinaceous or viral fractions.

1           36.   The kit of claim 35 further comprising a MALDI target for  
2 collection of a resolved fraction and subsequent mass spectrometric analysis  
3 thereof.

1           37.   The kit of claim 35 further comprising a machine-readable label  
2 affixed to at least one of said first separation matrix, said second separation  
3 matrix, and a container enclosing said separation buffer.

1           38.   A sample separation system comprising:  
2           a pipetting robot;  
3           a first separation array;  
4           a second separation array; and  
5           a microprocessor directing said pipetting robot to transfer material  
6 between said first separation matrix and said second separation matrix.

1           39.   The system of claim 38 wherein said first separation matrix and  
2 said second separation matrix are both microplates.

1           40.   The system of claim 38 wherein said pipetting robot further  
2 comprises a gripping actuator.

1           41.   The system of claim 39 wherein said microplates maintain well  
2 addresses between said first separation matrix and said second separation  
3 matrix.

1           42.   The system of claim 38 further comprising machine readable  
2 labels affixed to said first separation matrix and said second separation matrix.